

REMARKS

Claim 1 has been amended to further define the moieties designated by lines linking the X and Z functional groups to alternatively include a direct link between X and Z or a straight or branched chain alkyl linking group containing 1 to 20 carbon atoms when Z is an oxyethylene polymer or an oxyethylene containing polymer. Original claim 1 required that the moiety linking the functional groups X and Z have a molecular weight of between 50 and 4000. This is clearly inconsistent with the limitations of original claims 5-8. This amendment is supported in the specification as well as original claims 5-8. No new matter has been added.

An object of the present invention is to incorporate a surface-modifying compound into the wall material of a microcapsule comprising an encapsulated material (agrochemical) enclosed within a solid permeable shell of a polymer resin. The surface-modifying compound has one or more moieties -X which react with the wall-forming material and one or more moieties -Z that remain free and modify the surface properties of the microcapsule. The resultant microcapsule may be envisioned as a tiny balloon containing the encapsulated material wherein the outer surface of the balloon is covered with a layer of surface modifying compounds having one end "locked" to the surface by reaction of the moiety -X and the other end (with the -Z moiety) free to modify the surface properties. Typically the moiety -Z has surfactant properties but, unlike conventional surfactants, the surface modifying compounds are "locked" to the surface of the microcapsule and are not so readily desorbed as will occur with conventional surfactants. Many beneficial properties that may result from surface modification are described in the application. Some of these are summarized on page 36, lines 11 to 29 and include for example improved stability, reduced agglomeration, reduction of particle size growth, improved thermal storage stability, improved formulation compatibility, improved soil mobility, reduced foaming, improved redispersability and better control of the size of the microcapsule. More specifically, Example 10 shows that incorporation of dimethylol propionic acid into the wall of a polyurea microcapsule provides self-stabilized microcapsules. Examples 13 and 21 also generally demonstrate the ability to produce stabilized microcapsules without the use of free emulsifier. Example 11 demonstrates improved re-dispersability of spray-dried microcapsule resulting from incorporation of a group -Z according to the present invention. Example 4 demonstrates improved re-dispersibility of the microcapsules. Example 23 shows that incorporation of anionic or steric modifying groups, -Z increases the movement of the microcapsule through the soil relative to unmodified capsules.

Claims 1-4 and 16-26 have been rejected under 35 U.S.C. 102(a) as allegedly being anticipated by van Kopp nhagen (WO 00/05951). Applicants respectfully traverse.

The prior art cited by the Examiner does not disclose the incorporation of a surface-modifying compound in a microcapsule wall such that a surface-modifying moiety –Z remains free to modify the surface of the microcapsule.

The Examiner cites WO 00/05951 (Van Koppenhagen). Van Koppenhagen relates to a microcapsule formed of an aminoplast shell wherein the wall contains an ester moiety such that the microcapsule walls are stable under normal conditions but are rapidly disintegrated or degraded under basic conditions to produce a relatively quick release of the encapsulated materials. Van Koppenhagen discloses no unreacted surface modifying groups corresponding to –Z of the present invention. Van Koppenhagen discloses an ester moiety (I) suitable for incorporation into the shell wall (and having links capable of being disrupted in the presence of base). The ester moiety is the reaction product of a “core” which is a multifunctional aliphatic or cycloaliphatic alcohol such as pentaerythritol and the appropriate number of randomly oligomerised esters of 2-(hydroxy or thiol) substituted C2-C6 alkanolic acids. Applicants respectfully submit that the Examiner is therefore incorrect to equate the groups capable of esterification in Van Koppenhagen with the groups –Z of the present application. In the compound of formula (I) in Van Koppenhagen, the groups capable of esterification have already been reacted with the alcohol groups of the core. All this takes place before the compound of formula (I) is incorporated into shell wall. Incorporation into the shell wall takes place by reaction of the groups –XH (–OH or –SH) with an amino-formaldehyde pre-polymer. It is conceded therefore that the ester moiety of formula (I) in Van Koppenhagen has reactive groups corresponding to –X in the present application but there is no disclosure of an unreacted group –Z capable of modifying the surface properties of the microcapsule wall.

Claims 1-7 and 16-26 have been rejected under 35 U.S.C. 102(b) as allegedly being anticipated by Scher et al. (US 5,160,529). Applicants respectfully traverse.

The Examiner further cites US 5,160,529 (Scher). Scher discloses the use of pentaerythritol tetrakis (3-mercaptopropionate) which is a tetrathiol ester to alter the permeability of the microcapsule wall and thus the release rate of the core liquid. As with Van Koppenhagen, the tetrathiol ester contains reactive groups (–SH) equivalent to –X in the present application and capable of reacting with the methylol groups of the prepolymer. There is however no unreacted group equivalent to –Z of the present application capable of providing surface modification.

It is respectfully submitted that the claims of the present application are both novel and inventive having regard to the disclosure of Van Koppenhagen and Scher and that the Examples, as discussed above, provide extensive evidence that the present invention presents a solution to the problem of providing a microcapsule having a beneficially modified surface.

In view of the above amendments and arguments, Applicants respectfully submit that the rejections under 35 U.S.C. § 102(a) and 102(b) have been overcome and hereby request that this application be passed to issue.

As this response is submitted within four months from the mailing date of the Office Action, a one (1) month extension of time is included herewith.

However, in the event the undersigned is mistaken in his calculations, an appropriate extension of time to respond is respectfully requested, and the Commissioner is authorised to debit the appropriate fee for that extension, or any other fee, from the deposit account of the undersigned, no 50-1676 in the name of Syngenta Crop Protection, Inc.

Respectfully submitted,

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